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Analogy between electron heating mechanisms in symmetric dual and asymmetric single frequency capacitive RF discharges JULIAN SCHULZE, BRIAN HEIL, DIRK LUGGENHOELSCHER, UWE CZARNETZKI, Ruhr-University Bochum, BERT ELLINGBOE, Dublin City University — Electron heating mechanisms in single and dual frequency capacitively coupled RF discharges are a current research topic. Many theoretical, but only few experimental investigations on this topic exist. In this work electron heating is investigated experimentally in dual and single frequency discharges by Phase Resolved Optical Emission Spectroscopy. In both cases, the generation of beams of high energetic electrons during sheath expansion is identified to be the dominant cause of heating. In an asymmetric single frequency discharge the Plasma Series Resonance effect leads to high frequency modulations of RF current and sheath width similar to the sheath oscillation using two frequencies, which are caused by a second externally applied high frequency voltage. These modulations can be observed in terms of excitation in both cases. The reflection of electron beams at the opposite plasma boundary as well as a localised field reversal during the phases of sheath collapse is observed applying one and two frequencies. Electron heating is generally related to the sheath motion, which can be similar in dual and single frequency discharges under certain conditions. The physics of the beams and related excitation seems to be similar, although the rapid sheath oscillations have quite different causes.

Julian Schulze
Ruhr-University Bochum

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